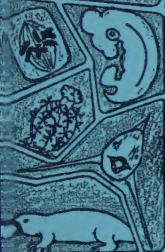


RESEARCH

STEIL



The Biologist



Vol. XXI, No. 4

May, 1940



SUMMER IN EUROPE

BEERS

Phi Sigma

BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although originally designated as an honorary biological research society, it should now be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts:

- 1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.
- 1916 May, Central Governing Body organized, BIOLOGIST first issued.
- 1917 June, last War-time BIOLOGIST issued.
- 1921 February, BIOLOGIST revived.
- 1924 December, First National Meeting, Constitution revised, Washington, D. C.
- 1925 December, Second National Meeting, First Scientific Program, Kansas City.
- 1926 December, Third National Meeting, Second Science Program, Philadelphia.
- 1927 December, Third Science Program, Nashville.
- 1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
- 1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Meeting, Fifth Science Program, Cleveland.
- 1931 Phi Sigma Letters Registered, U. S. Patent Office.
- 1932 December, Sixth Science Program, Atlantic City.
- 1933 June, Sixth National Meeting, Seventh Science Program, Chicago.
- 1935 December, Seventh National Meeting, Eighth Science Program, St. Louis.
- 1937 December, Eighth National Meeting, Ninth Science Program, Indianapolis.
- 1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.

Expansion:

The Constitution provides that: "An active chapter may be established in any institution of learning which requires for graduation the equivalent of four years of collegiate work, and which is equipped with facilities for research work. - - - Any petitioning group must be active for at least one year before it may be granted a charter."

THE BIOLOGIST

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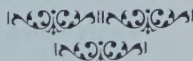
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OF ALL ACTIVE AND INACTIVE CHAPTERS

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ALPHA

Ohio State University, Columbus, Ohio, founded March 17, 1915, (Inactive).

BETA

University of Michigan, Ann Arbor, Michigan, founded June 3, 1916

DELTA

University of Maine, Orono, Maine, founded January 27, 1917.

EPSILON

University of Denver, Denver, Colorado, founded March 5, 1917.

ZETA

University of Wisconsin, Madison, Wisconsin, founded May 30, 1917

ETA

University of Akron, Akron, Ohio, founded April 20, 1921.

THETA

Michigan State College, East Lansing, Michigan, founded April 9, 1921, (Inactive).

IOTA

Washington University, St. Louis, Missouri, founded May 28, 1921.

KAPPA

University of Kansas, Lawrence, Kansas, founded May 31, 1921.

LAMBDA

University of Montana, Missoula, Montana, founded May 4, 1921.

MU

University of California, Berkeley, California, founded April 27, 1922.

NU

Washington and Jefferson College, Washington, Pennsylvania, founded May 11, 1922.

XI

University of Nebraska, Lincoln, Nebraska, founded May 3, 1924, (Inactive).

OMICRON

University of North Dakota, Grand Forks, North Dakota,
founded May 26, 1924, (Inactive).

PI

Emory University, Georgia, founded January 3, 1925.

RHO

University of Illinois, Urbana, Illinois, founded March 28, 1925.

SIGMA

University of Florida, Gainesville, Florida, founded December 4, 1925.

TAU

Duke University, Durham, North Carolina, founded March 4, 1926.

UPSILON

Miami University, Oxford, Ohio, founded May 7, 1926.

PHI

University of New Hampshire, Durham, New Hampshire, founded May 21, 1926.

CHI

Montana State College, Bozeman, Montana, founded February 11, 1927.

PSI

University of Washington, Seattle, Washington, founded April 7, 1928.

OMEGA

University of Oklahoma, Norman, Oklahoma, founded March 24, 1928.

ALPHA ALPHA

University of Southern California, Los Angeles, California, founded May 17, 1930.

ALPHA BETA

Mount Union College, Alliance, Ohio, founded May 17, 1928.

ALPHA GAMMA

University of South Dakota, Vermillion, South Dakota, founded May 15, 1928, (Inactive).

ALPHA DELTA

Lawrence College, Appleton, Wisconsin, founded March 7, 1929, (Inactive).

ALPHA EPSILON

University of Pittsburgh, Pittsburgh, Pennsylvania, founded March 23, 1929.

ALPHA ZETA

College of William and Mary, Williamsburg, Virginia, founded April 19, 1930, (Inactive).

ALPHA ETA

Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, founded March 13, 1930.

ALPHA THETA

State College of Washington, Pullman, Washington, founded May, 1930.

ALPHA IOTA

Bucknell University, Lewisburg, Pennsylvania, founded January 9, 1932.

ALPHA KAPPA

Hunter College, New York City, founded January 8, 1932.

ALPHA LAMBDA

University of Utah, Salt Lake City, Utah, founded February 13, 1932.

ALPHA MU

University and State College of Oregon, Eugene-Portland-Corvallis, Oregon, founded November 18, 1933.

ALPHA NU

University of New Mexico, Albuquerque, New Mexico, founded April 21, 1935.

ALPHA XI

Rhode Island State College, Kingston, Rhode Island, founded May 17, 1935.

ALPHA OMICRON

Marquette University, Milwaukee, Wisconsin, founded June 18, 1938.



DR. FRED A. BARKLEY, *Vice-Chancellor*

List of Publications

By Dr. Fred A. Barkley

A Monographic Study of *Rhus* and Its Immediate Allies in North and Central America, Including the West Indies. *Annals of the Missouri Botanical Garden* 24: 265-498. 1937.

FRED A. BARKLEY

Studies in the Anacardiaceae. II. *Annals of the Missouri Botanical Garden* 24: 499-500. 1937.

FRED A. BARKLEY

A Short History of *Rhus* to the Time of Linnaeus. *The American Midland Naturalist*. 19: 265-333. 1938.

FRED A. BARKLEY AND E. D. BARKLEY

Studies in the Anacardiaceae. III. *The American Midland Naturalist* 19: 598-600. 1938.

FRED A. BARKLEY

Studies in the Anacardiaceae. IV. *The American Midland Naturalist* 22: 209-211. 1939.

FRED A. BARKLEY AND MERTON J. REED

Actinocheita. *The American Midland Naturalist* 21: 368-377. 1939.

FRED A. BARKLEY AND MERTON J. REED

Keys To The Phyla Of Organisms. 39 pp. (University of Notre Dame Press) Associated Student's Store, Montana State University, Missoula, Montana. 1939.

FRED A. BARKLEY

Mosquitoxylon and *Pseudosmodingium*. *American Midland Naturalist*, in press.

FRED A. BARKLEY AND MERTON J. REED

PRESENT STUDIES:

Bibliographic studies of the taxonomy of the Anacardiaceae; Monographic studies of *Schinus* and *Schinopsis*, Monographic Study of *Pistacia*, with M. J. Reed.

The New Vice Chancellor

By WILLIAM F. STEVENS

(Condensed from an article in THE PALM of Alpha Tau Omega,
Volume LIX, pp. 25-26, June 1939.)

Dr. Fred A. Barkley, Washington U. '35, now an instructor in the botany department at Montana State University, recently was awarded \$550 by the American Philosophical Society to continue his study of the plant family, Anacardiaceae, which produces, among other things, the mango, the cashew nut, Oriental lacquers, and poison ivy!

Though the award places a heavy stamp of approval on the work of this young Montana instructor, Dr. Barkley has been digging away at Anacardiaceae for many years. He has produced one great monograph and several shorter works on this family. In pursuing the subject, Dr. Barkley held the Balyeat fellowship at the University of Oklahoma for two years and at Washington University, St. Louis, for one year.

Dr. Barkley's courses offered at Montana State University include Systematic Botany, Comparative Plant Morphology, and Advanced Taxonomy. The two quarter systematic botany course presents a very heavy teaching load since this course is required of a large portion of the students enrolled in the forestry school. Montana has one of the highest government rated forestry schools in the United States. As a reference text for his comparative morphology course, Dr. Barkley recently completed "Keys to the Phyla, and Orders of Plants," which has just come off the press.

Dr. Barkley and Dr. Severy, also of the botany department, this spring lead

the annual field trip for the systematic botany students. This trip, which starts April 29, and lasts until May 14, enables Montana botany students to study in their natural habitat the plants and vegetation of the western states. The trip covering a distance of 3,500 miles is traveled by automobile and extends into the famous Idaho batholith, the salt flats of Utah, the Bryce Canyon of Wyoming, the Grand Canyon of Colorado, the Suahara Desert of Arizona, Boulder Dam, and the famed Zion Canyon. This trip is one of the highlights in the life of every forester at Montana.

Several years ago Dr. Barkley dashed off a short piece for the *Missouri Botanical Garden Bulletin* in which he pointed out that "ivy-poisoning" is often due to plants other than poison ivy and sumac. Within a few months this article had been reprinted in several other bulletins and copies were in wide demand. Seldom in any plant family are the useful and the poisonous properties so intermingled as they are in the Anacardiaceae. Besides fruits and nuts, the family yields resinous juices used for medicinal substances and varnishes; supplies valuable tanning and dyeing materials, gums, woods, and ornamental plants.

Last fall Dr. Barkley published a monographic study of the genus *Rhus* under auspices of the Missouri Botanical Gardens. During the summer, Dr. Barkley and a research assistant, Merton Reed, spent several weeks at the

Field Museum of Natural History in Chicago, starting a card file listing over 3,600 species of the Anacardiaceae family. Barkley and Reed now have an article on press in the *American Midland Naturalist*. Dr. Barkley engaged in the Chicago study entirely at his own expense. However, with the recent grant from the American Philosophical Society, he and his assistant plan to study this summer at the herbarium of the Smithsonian Institute and at the New York Botanical garden.

Dr. Barkley joined the staff at the University of Montana in the fall of 1937. Under his guidance and painstaking work, some 6,000 specimens have been added to the university herbarium so that it now contains 33,000 specimens. The curator exchanges specimens with curators of other herbaria. Many of the valuable

species in the Montana collection have been secured through international exchanges with curators of distant lands.

Dr. Barkley has been assisted in much of his work by Mrs. Barkley, who holds both Bachelor's and Master's degrees from the University of Oklahoma in systematic botany. She is the author of several scientific publications and holds membership in Phi Sigma and Phi Beta Kappa. The Barkleys have three children, Robert Wheeler, four; William Hugh, two; and a daughter, Anne, born last January.

The doctor is a member of Phi Beta Kappa, Sigma Xi, Phi Sigma, Phi Delta Kappa, Kappa Tau Pi, and several biological and other scientific societies. He likes to hike and is in charge of the summer school excursions held weekly during the summer session at Montana.



Research

By W. N. STEIL*

Research in a scientific field is independent investigation, the object of which is to establish the truth in regard to either living or dead phenomena. In the former—in living things—the Biologist is interested, and in my discussion I shall confine most of my references to the field of Biology.

THE WORKER

All of the necessary facilities for research may be provided for the worker, and yet he may not succeed in the solution of the problems which are the object of his investigation. His failure to produce results may be attributed to the fact that he may lack aptitude or other qualifications which peculiarly fit him for investigational work.

It is evident that the worker must be interested, not only in the discovery of new knowledge, but also in the special type of work research demands of him. Unless, therefore, he is interested in difficult and trying research work, he cannot succeed.

The desire to discover new facts or new knowledge must amount to a passion with him. I suppose that this passion in the worker to do research should be similar to that of a pre-medical student who had been in one of my classes a number of years ago. He had evidently some difficulty in making the grades which would admit him to a medical school. After attempting to determine why he was not doing better work, I finally asked him

how anxious he was to become a physician. He unhesitatingly exclaimed, "I could die for it!" This student completed the medical school course and is now a successful physician in this state.

The desire to do research should not, of course, be a sentimental kind of passion. Even those who have undertaken research in the hope that health might be improved or life saved were not sentimental about the matter although they knew perhaps that they were risking their own lives in the work.

To get the true facts and arrive at correct conclusions is the investigator's constant aim, and if he has a sincere desire to discover truth, he is amply rewarded when he finds it.

Being a seeker of the truth, it is obvious that the worker himself must be honest. Hence, he never draws conclusions until he has checked his work against his controls. He should repeat whenever possible the observations and then draw his conclusions only on the basis of established facts.

Incidentally, I wish also to state that the honest worker always gives due credit for the work done by others. Most certainly, he will never take the credit for work which has been done by others. Unfamiliarity of the literature in the field of his research may account for the fact that he may take the credit for a discovery which rightfully belongs to another. However, ignorance of the literature does not justify him.

*Read at the ceremony commemorating Phi Sigma Silver Anniversary under the auspices of Alpha Omicron Chapter in the Marquette Medical School Auditorium, Milwaukee, Feb. 11, 1940.

The worker never begins a project with foregone conclusions, which obviously come at the end of an investigation, since observation and experimentation are necessarily the first steps the worker must take.

Perhaps you may recall that when the discussion of spontaneous generation had reached its climax, Pouchet of France determined to settle the question. He assumed first that spontaneous generation occurred, and then attempted to give proof for the phenomenon. Taking a flask, he filled it with water, sterilized it, and then inverted it over a dish containing mercury. Next, he sterilized hay and with a sterilized forceps introduced it into the flask. Since the liquid in the flask later became turbid, no doubt bacteria were produced in large numbers, and Pouchet believed that he had proved abiogenesis, or spontaneous generation of life. It is true, as Pasteur showed later, that Pouchet lacked a control in his experiment, but if he had not accepted without proof as a fact that living matter comes from dead matter, even before he began his work, he may not have fallen into error so readily. The story of Pasteur's work on spontaneous generation is generally known. He proved not only that biogenesis occurs, but also pointed out that in Pouchet's experiment the bacteria were introduced from the dust particles on the surface of the mercury and which were carried into the flask with the hay.

The worker, hence, approaches his problem unbiased, and desires only to discover the correct facts. He may, however, formulate a number of hypotheses and then proceed to test the truth or falsity of each one. Frequently, this method is a very commendable one, since he need not favor one over any other hypothesis. No

doubt, the formulation of hypotheses is an excellent means for organizing the investigation, and hence, much time may be saved for the worker.

Originality is one of the most important qualifications of the investigator, as is obvious from the fact that he is seeking new knowledge. I am wondering whether our colleges and universities encourage originality, so important in research in even its best students. Perhaps the amount of subject matter in our courses which a student must cover in a given time may be partially responsible for the situation. There can be no doubt that especially in the Junior and Senior years, students should be expected to do some original work.

Originality in research implies that there be not too much leaning on the past, and therefore that the worker exercise not only originality but also independence in thinking and judgment. I am not certain which is the more important in research, originality or independence, but I know that independence requires courage, sometimes lacking in the most capable worker.

The importance of originality and independence in the investigator can be better appreciated if our attention is called to the fact that there is much knowledge, presumably the result of scientific study, which requires re-investigation.

Reference shall be made to a few examples of such knowledge, generally accepted for many years to be true, but upon more recent study shown to be false.

As is generally known, every typical cell possesses a nucleus which is associated with very important life processes including metabolism and reproduction. The nucleus has generally been described as a nearly

spherical body containing a substance which, with the delicate connecting linin threads, forms a network, the chromatin. Usually in this "resting" nucleus there can be observed, also, spherical homogeneous bodies known as nucleoles. The nature of the nuclear material, suspended in the colorless nuclear sap enclosed by a definite membrane, seemed to be little questioned until recently when it was shown that in the nucleus, the chromatin is organized in the form of rod-like structures—the chromosomes. The early stages of division of the nucleus were described as follows: There was at first an aggregation of the chromatin and linin and then a long thread was formed which shortened and thickened, and which split throughout its length, and later segmented to form a definite number of short rods—the chromosomes.

For a long time, cytologists questioned the correctness of this description, since it seemed evident that the individuality of the chromosomes could not be lost at any stage, if the number was to remain constant in the nucleus.

As a result of studies made of living and fixed cells, we now know that our description of the "resting" or metabolic nucleus is quite incorrect. The chromosomes are constant structures of the nucleus, as has just been stated, even in the "resting" or the metabolic stage. Hence, also, there is no organization of a long spireme which we described as a single thread but a number of threads always equal to the number of chromosomes. Hence, we assume that the chromosomes are more or less definitely and permanently organized in the nucleus, usually in the form of rods.

The chromosome itself was generally described as a more or less homogeneous rod, but recent study has

demonstrated that it is composed of a matrix with the chromatic material in the form of one or two somewhat spirally coiled threads—the chromonemata which in turn bear the genes, the physical bases of the hereditary characters.

These contributions in regard to the nucleus are most important in furthering our knowledge not only of cytology but also of genetics.

Amitotic nuclear division has been described in certain tissues of plants and animals. According to the description of most Biologists, amitosis was a direct method of nuclear division which took place in the "resting" condition of the nucleus, when there was presumably no organization of chromosomes, and no spindle fibres. It was described merely as a process of constriction which resulted often in an unequal division of the nucleus.

A re-investigation of amitosis has resulted in a new interpretation of the phenomenon, first described in 1919 (7) in the spore sacs of a fern as incomplete nuclear division, and recently by others (1, 5) as interrupted division. In this kind of division the earlier stages, especially prophase and metaphase, are not completed. In other words, there is an interruption of the mitotic process so that the chromosomes do not reach the poles of the spindle, and hence, in the reorganized or restitution nucleus the number of chromosomes will have been doubled.

Most interruptions of these divisions occur in the prophase, although it is not difficult to find them in the metaphase. Anaphase stages may show that some chromosomes lag between the poles of the spindle. These interruptions in mitosis in a prophase are followed by the reorganization of the nucleus, spherical in form, and in the

later stages in a nucleus irregular in form such as kidney-shaped or dumb-bell shaped. Later, however, these nuclei may also take on the spherical form.

It can be readily understood why amitosis was not more carefully studied long ago, since the phenomenon was regarded as of little importance. It was also generally observed in tissue which was in a stage of disintegration, and hence a careful study of this type of nuclear division was much delayed.

In 1919, as has already been stated, and later in 1932 (3) and 1933 (4) however, the phenomenon was reported as occurring in normal tissue in the spore sacs of certain ferns. In these ferns just before the reduction division there is an incomplete nuclear division, resulting in the doubling of the number of chromosomes.

I shall point out briefly some very significant facts in regard to incomplete nuclear divisions, a discovery which resulted from a study of amitosis.

1) Probably incomplete nuclear divisions occur in all tissues of plants and animals in which amitosis has been described. Cancer tissue may be given as an example in which amitosis as well as mitosis was commonly described. There is no doubt, however, that incomplete nuclear divisions and not amitotic divisions occur in active cancer cells.

2) Incomplete nuclear division occurs occasionally in nature, and thus the number of chromosomes in a plant or in an animal is doubled. As a result of fertilization, the number of chromosomes becomes doubled and as a result of an induced interrupted nuclear division when the zygote is about to divide, the chromosome number is doubled again, hence the num-

ber has become double diploid or tetraploid.

3) Many, if not all the cell fusions which have been reported especially in plants are probably incomplete cell divisions (7, 8, 9, 10, 11) which have been found to occur.

4) The discovery of these divisions may be of great genetic significance, since it is now known that many of our best economic plants possess polyploid nuclei. It is also known that plants and animals may become polyploid as a result of imposing upon them at certain stages such conditions as low or high temperatures, X-rays, radium, and certain chemicals including colchicine.

I suppose there are very few persons, especially among students who have had a course in college Zoology who are unfamiliar with the idea of reversion in an animal to an ancestral form. Although the phenomenon was generally assumed to occur, there was mystery about it. As an illustration, we may refer to one of the most common examples of reversion—the appearance of a gray rabbit from parents which were not themselves gray. In this case, it was assumed that the gray rabbit was a “throw-back” or a reversion to the common wild ancestor.

It was in the field of Genetics that the correct explanation for reversion was found. The gray or agouti color of the rabbit, it was found is produced as a result of complementary factors which are borne by parents neither of which is gray.

For many years we believe that the factors for the growth and development of an ordinary green plant were as follows:

1. A sufficient amount of oxygen for respiration,
2. Favorable light and temperature,

3. A sufficient amount of:

- (1) Carbon dioxide,
- (2) Water,
- (3) Certain essential elements such as nitrogen, hydrogen, oxygen, carbon, calcium, magnesium, iron, potassium, phosphorus, and sulphur.

It has recently been discovered, however, that there are many other essential elements, including, for some plants, boron in very small amounts. It has also been found that the lack of certain elements or a lack of balance in certain elements in the soil, may cause abnormal development in a plant, such as chlorosis. The acidity of the soil has been found to be of utmost importance. Also, certain hormones and other growth substances such as the vitamins have more recently been found essential to the best development of plants.

So many new discoveries have resulted because of a re-investigation of the favorable conditions for the growth of the higher plant, that it now seems that much of what we learned of physiology of the plant in our college days must be revised and much discarded.

At present we are acquiring so much knowledge that is new about the conditions for plant growth that interest in research in this field is growing by leaps and bounds.

The research worker must also possess constancy or stick-tuitive-ness, since many of the problems confronting the worker require much time, often extending over a long period, even for years.

The worker must also possess the power of concentration. The problem or the special object of his study should preoccupy his mind. I think some facts of history in regard to men who possessed great powers of concentra-

tion—the kind the research worker should have, may be of interest. The story of Archimedes, the great geometer, is known to every student. During the battle, raging at his door, he was so absorbed in his work, perhaps unconscious of what was going on, and when the soldiers entered his room to capture him, he merely exclaimed, "Don't spoil my circle!"

Edison, it has been stated, was so absorbed in his work that he forgot to meet his bride at the time set for the wedding ceremony. It is known that Newton concentrated so much on his work that when his lady friend came to his work shop one day, he sat down on a bench to visit with her and when he prepared his pipe for smoking he used one of her fingers to press down the tobacco.

One of the best stories in regard to a research worker, possessing great powers of concentration, is that told of Piccard of stratosphere fame. The physicist is a great student of nature and in his walks he jots down into a notebook his observations. Piccard on one occasion decided to get the heart beat of a frog which he had captured in a small pond. Holding the frog in one hand and his watch in the other, he proceeded to make the count. When he had finished he threw the watch into the pond and put the frog into his pocket. Perhaps, you will think that Piccard is an example of the so-called absent-minded professor who, I claim, is not at all absent minded, but possesses great powers of concentration which should be the envy of the rest of us who lack such wonderful powers of application.

The worker should possess an aptitude for research. We know that there are such aptitudes and one wishing to go into research should be grateful that nature has endowed him with this

talent. Training, however, plays a great part and it will make the worker who has natural ability for research a better and more efficient investigator, and often it may serve as a substitute for aptitude.

The training for research should extend over a period of several years, and, perhaps, it should be of the kind that leads to a Ph.D. degree. It is assumed that during the period that a study of subjects, cognate to his field, be undertaken so that he will have a good background for the work to be done in the field.

MORE RECENT CONTRIBUTIONS IN BIOLOGY

We shall define what is generally considered a contribution or advancement in science including biology. I think there is universal agreement that the discovery of new knowledge or a new interpretation of the old knowledge is a contribution.

The knowledge need not be of immediate practical application. In fact, the application may be quite remote and sometimes even not during the life-time of an individual. It must always be borne in mind that the discovery of new facts and principles always precedes their application which usually comes later.

I suppose recent contributions may include those which have been made during the past quarter of a century. Perhaps, we should not go so far back since within the past ten years, even within the past five years, there have been so many discoveries in biology that the more recent work has almost over-shadowed the work of the past.

We may agree as to what advances are recent by deciding on a certain discovery, perhaps of a quarter of a century ago, which has had a great influence on future biological research. Then we shall have to go back to 1906, thirty-four years ago, when it was first

discovered that certain traits in a plant or in an animal may go together in inheritance, such as tallness and red-floweredness and dwarfness and white-floweredness which may be inherited together, apparently contrary to the law of Mendel, formulated about forty years earlier, and according to which every trait is inherited independently of every other one. Later, it was also found that in a certain percentage of cases the traits do not remain paired, but pass over from one individual to the other. As a result of this separation, or breaking of the linkage, a cross between tall red flowered plants and dwarf white flowered plants produces in the second generation some plants which are tall and white and some which are dwarf and red. Since this event actually stimulated future intensive studies not only in genetics, but also in other fields of biology, we may agree that our starting point is the year 1906.

It is obvious that the search for an explanation of crossing over and linkage led to an intensive study of cytology—the cell and the nucleus, including the chromosomes with their genes which are not comparable to the atoms of the chemist or the physicist, but are actual material substances—the bearers of the hereditary characters.

Since there are three fields of biology in which most of the work has been done and is being done at present—Cytology, Genetics, and Physiology—most of my rather brief discussion will be confined to recent contributions in these fields of investigation.

We have already made reference to some of the studies in cytology, by both the botanist and the zoologist. Since the plant is so favorable for the study of nuclear phenomena, including ordinary division or mitosis, the botanist has naturally made many contributions

to our knowledge not only in regard to the nature of the nucleus, the structure of the chromosome, but also nuclear divisions.

The incomplete mitosis or interrupted nuclear division has also been described. The work being done at present, especially with the drug colchicine is an attempt to step up the chromosome number by means of incomplete nuclear division, as has also been stated. We have already succeeded in doubling the number of chromosomes in a number of plants and animals. Of special interest is the work of Pincus and Waddington (6) who treated dividing fertilized egg cells of the rabbit with colchicine. In the gametes of the rabbit there are 22 chromosomes, hence there are 44 chromosomes in the fertilized egg and in the cells of the mature individual. By means of colchicine, the division of the zygote nucleus was interrupted, and there was thus established a nucleus with 88 chromosomes, the double diploid number.

A very important genetic phenomenon already referred to has recently been described by Blakeslee (1) as a result of inducing these peculiar divisions in hybrids which are sterile because there can be no pairing of the chromosomes before the gametes are formed. However, the pairing is made possible by treating the hybrid plants, as for example, with colchicine and obtaining fertile tetraploids or double diploids.

There is another manner in which the number of chromosomes can be doubled. I refer to the phenomenon known as apospory, of frequent occurrence in the mosses and the ferns. This phenomenon and the manner in which the chromosome number may be increased will be described in a common fern.

As is well known, there are two dis-

tinct phases in the life cycle of the fern, the gametophyte and the sporophyte. The former begins with the spore which upon germination produces the heart-shaped prothellium which bears the sex-organs and the gametes—sperms and eggs. As a result of fertilization a zygote is formed. This is the first stage of the other phase of the life cycle, known as the sporophyte, because finally the mature fern plant produced by it forms spores again. After the zygote germinates, the embryo is formed which consists of root, leaf, foot—the organ by means of which the plant gets its food from the heart-shaped body, the gametophyte—and the stem which later produces more roots, leaves, fronds, and finally spores.

Having these steps of the life cycle clearly in mind it is easy to understand the phenomenon of apospory. Apospory occurs when the gametophyte originates directly from the vegetative cells of the young or mature leaf or frond. Often in ferns, apospory has been induced by cutting off portions of the leaves of young sporophytes and planting them. It is evident that the gametophyte thus formed will be diploid or $2n$, while the new sporophyte produced by the $2n$ generation, as a result of fertilization, will be tetraploid. It is evident that the $8n$, the $16n$, etc., number of chromosomes can also be established in both generations.

It is needless to state that the cytologist and the geneticist are not content with their success in producing polyploids but they are also much interested in the following facts:

1. Effect on cell size. To what extent can the factors which limit cell size be broken down, such as, for example, heredity, cell-wall, etc.

2. Effect of polyploidy on size of plant or animal. Obviously, polyploid organisms may be of large size, but are not always found to be of large size.
3. Effect on hereditary expression of plant or animal.
4. The production of fertile from sterile hybrids.

We have referred to the gene, a small portion of a chromosome which bears the hereditary character. Not only has it been determined that the gene actually exists, but the exact location of certain genes in the different chromosomes of some plants and animals has been determined.

The chromosome maps—chromosomes showing the location of the genes of a plant or animal enables us to understand the loss of a character when a portion of a chromosome with the gene for that character is lost or translocated to another chromosome. Although the genes are located in the chromosomes by the frequency of their crossing-over, from one to another, this phenomenon can be better understood after the location of the genes is known. The crossing-over referred to is an event which stimulated research in cytology and genetics, and is only one of the many contributions of the research worker in Biology.

In the field of physiology, there is at the present time as much if not more work done in research than in cytology or genetics. We have become so well acquainted with taxonomy and anatomy that it is only natural that our studies should now be directed to the interesting and important life processes, and especially since they may be intimately related to vigor, growth and development. Recently also, we have come to realize more than ever before, that the physiology of a plant or an animal, including man, involves

many factors and conditions, some of which are still unknown and others not well understood.

In the plant, we have pointed out, for example, that certain conditions for growth and development were believed to be necessary, but that factors like pH and hormones were usually not considered important.

For a long time we realized that the development of a good root system to absorb a sufficient amount of water and mineral salts, is necessary for best growth. One of the ways in which such a root system of a plant could be made much greater was by transplanting. In the process, as is evident, many of the roots were broken off and as a result many more new roots were produced.

If, however, cuttings of a plant were made, such as those of the apple, they failed invariably to produce roots. Recently, as is well known, certain hormones like auxilin and hormodin have been used to treat the cuttings to stimulate them to form roots in great abundance. The discovery of the presence of the hormones in plants is a recent one. I suppose in the animal we have so closely associated these substances with the ductless glands or the endocrine glands that we thought that a plant, lacking such glands, could not produce hormones.

No doubt, the results of the studies of these glands, and their functions must be listed among the most important contributions of the biologist. Much time could be devoted to their discussion alone.

A few statements should be made about the recent use of vitamin B₁ which is produced in the foliage leaf of the plant, and then goes down to the roots causing them to form in abundance and stimulating the plant to great growth, large flowers, and abundant fruit. One gram of the extracted

crystalline substance costs about \$6, and will make about 25,000 gallons of water solution. Only plants having roots should be treated since cuttings are not ordinarily stimulated, so far as is known, to produce roots when treated with B_1 . Only plants which are deficient in this vitamin are benefited by treatment with B_1 .

It is impossible to state, from the work so far done with this vitamin, which is heralded as a miracle worker, how valuable it will be, especially for growing certain plants which are deficient in B_1 . It can be predicted that some commercial producers of the vitamin through exaggerated statements in advertising which deceive the public will make much profit from their sales.

The seed which is composed of at least two parts, the embryo or miniature plant, and the protective seed coats, has been the subject of much study by the physiologist. A considerable portion of the work has been confined to the phenomenon known as dormancy, studied by Crocker (2) and others. In this state the seed which possesses vitality fails to germinate when provided with the ordinary conditions for germination, namely water, favorable temperature, a sufficient amount of oxygen and, in certain seeds, also light. Not only have the causes of dormancy in seeds been studied, but the various ways in which dormancy can be broken have been investigated. For example, if the coats of the tissue surrounding the embryo are impervious to water, or prevent the movement of gases such as CO_2 or oxygen in the seed, or prevent the expansion of the embryo, the seed will not germinate. It has also been discovered that the chemical changes in the seed from the time of ripening to the time of germination may require a shorter or longer time. This period, known as

"after ripening," can now by various means be speeded up so that the seeds will germinate at once.

The importance of dormancy of the seed is, no doubt, of much more interest than longevity. This fact becomes evident when it is known that millions of bushels of such seeds as wheat in a state of dormancy have been sown in this country and which have never germinated.

THE REWARDS OF RESEARCH

The discovery of the truth is undoubtedly the greatest reward of the research worker. Perhaps, to no one, can come a greater compensation.

The reward may be in a name, well earned for work well done. However, no one considers it a worthy incentive to do research work to establish a name or a reputation. Such an incentive in a worker may lead to his doing many projects which may be quite insignificant. Such a worker may also wish to publish many papers, perhaps of doubtful value, in the false hope of making a name for himself. Since all of our good science publications have decided to accept only papers of high quality, such an investigator whose work is not meritorious cannot succeed in publishing his work.

The salary or income of the worker, often very good, is another reward, and let me add not altogether unworthy because the worker also needs certain necessities of life—food, shelter, and clothing. He is also entitled to medical care and perhaps, to some recreation.

Some research organizations present the worker with an honorium in the form of a monetary gift as a reward for worthwhile discoveries. Several institutions like our universities, including Wisconsin, have established foundations to encourage research which may lead to important discoveries. It shares with the worker the

profits which may accrue as a result of an application of the discovery, as for example, to industry or medicine.

Some institutions assume that, since they provide the facilities for research and pay the worker, that they are not obligated to share the profits which come as a result of the discoveries. This idea is a reflection of the condition sometimes existing in industry in which the employer is unwilling to share justly the profits with his workers. Since the worker is required to devote so much time to his research—time never recorded by punching a clock, and since it entails such hard work and frequently much anxiety, often at the risk of his health, the profits of research in an educational institution, I believe, should be divided between the institutions and the worker, and some of the institution's share should go into a fund to encourage and maintain worthy research projects.

There is also another reward of research which, however, is never sought for by the worker. I refer to the Nobel Prize of \$40,000, a gift for outstanding work. Our Morgan, a great Biologist who made so many important contributions as a result of his investigations of the humble little drosophila or ordinary fruit fly, received this reward.

Having completed my discussion I am aware that I have omitted reference to much of the recent and outstanding work, but, it was my intention to give only examples of some of these contributions rather than to enumerate all of them.

With the better facilities and equipment for research, improved methods, and encouragement given to it by vari-

ous organizations, departments of government and especially by our universities, it is easy to predict that the contributions which will be made in the next decade will far exceed those of any other preceding one.

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Summer In Europe

By CATHERINE V. BEERS, M.A., Asst. Professor of Zoology,
University of Southern California.

The summer of 1939 I planned to collect *Drosophila* in Iceland, to get a piece of oligocene amber with a fly in it from Danzig, to present a paper at the International Congress of Genetics at Edinburgh, and to fly home, westward across the North Atlantic in the Yankee Clipper.

The departure date, June fourteen, and delightful visits with relatives and friends across the states, brought me to the first congress of the summer—the Triennial of the Girls Friendly Society of America, meeting in Providence, R. I.

In New York I collected from Dr. Mary B. Stark, of New York Medical College, her fly tumor film, which shows her lethal and benign tumor stocks of *Drosophila melanogaster*. Dr. Stark had secured the necessary permits and I had them passed by the customs officer at the pier so I could bring the film back into this country. To bring live *Drosophila* into the United States, according to the new ruling, I must also have permits from Washington signed by the chairman of the Zoology department and Dean of the Graduate School of the University of Southern California, and by the state inspector as well as by the federal inspector at Washington, D. C.

Sailing July first on the S. S. Franconia, we had three days and three nights of foghorn, and I listened to the radio telling us that in these same northern waters the first North Atlantic mail plane flight was delayed because of fog.

In spite of the fog, thanks to Captain Bissett and Chief Engineer Shore, we arrived on schedule at Iceland, but no *Drosophila*. Both Mr. Arason, who is in charge of teacher training in Iceland, a friend of Mr. Goodman, of Los Angeles, and Dr. Stefason, of the University of Iceland had investigated for me and reported no *Drosophila* on the island. Two shopping and sight-seeing days, with Icelandic coffee in the homes of the Arasons and Jacobsens, made our visit to the island a happy memory.

Across the Arctic circle, up to the "Nord Cap," and down through the beautiful Norwegian Fjords, visiting the Baltic capitals of Tallin, Leningrad, Helsinki, and at Danzig, with the help of Dr. and Mrs. Wagner-Manslau, friends of Dr. Paul Popenoe, I found my biological ring. The fly in the amber: Soft, oozing turpentine dripping from a pine tree may have trapped the fly 30 million or more years ago—but man may have introduced the little "fungus gnat" into the fossilized resin when the expert melted the amber. In either case it is a good biological ring. Amber for Botany, and the fly for Zoology, and it is very pretty.

The International Federation of University Women, meeting in Stockholm was the second congress of the summer for me. Under the leadership of our honored and beloved American Dr. Gildersleeve, President, all hearts and minds were concentrated on peace and helping the refugees. At the opening meeting when we were honored by the presence of H. R. H. the Crown Prin-

cess of Sweden three speakers stressed the fact that responsibility and obligation must accompany freedom and privilege.

Then to Copenhagen, and out into the Danish countryside and seashore of the Kattegat with Miss Ebba Heyman, friend of Helen Wright Mahon, G. F. S. To see Hans Christian Andersen's lovely "Mermaid" in Copenhagen and Odense, then Esjberg, across the channel to Harwich, and to London for the beginning of the International Genetical Congress. After two days in London in the laboratories and experiment stations, one hundred of us, in four busses, went to Cambridge for two more days of meetings and punting on the River Cam. We saw Stratford on Avon, walked the Walls of Chester along the River Dee, a boat ride on Lake Windermere. Then up to Edinburgh where we lived in the University hostels for women.

That was August twenty-second. August twenty-third the Russian-German pact was signed, and almost immediately the military moved on to the University grounds to surround the buildings with barbed wire entanglements. The hostels would be evacuated within forty-eight hours if and when war was declared, and the buildings would then be used to concentrate enemy aliens.

Dr. Crew, of the University of Edinburgh, and his committee, planned everything so well that the genetics meetings were excellent and carried through to completion in spite of the threats of war, and the leaving of the Germans, Dutch, Danes, Norwegians, and Swedes.

The members from Poland, France, Italy, and the Americas remained to the end. Invitations for the next International Genetical Congress were extended by Italy and by Stanford University. So many of the ship sailings

were canceled that few of the Americans were on schedule—new bookings were necessary. On August 31 it was decided by the American Consul, American Express, Cook's and Dr. McFee, U.S.D.A., head of the American delegation, that because I had my clipper ticket in my pocket, I could continue with my original plans to be with friends in Yorkshire—but I must stay out of London and Southampton until instructed by Pan American.

So I left Edinburgh on the morning train, arriving in York at 2:30. I went to four hotels before a room was available, all the hotels being crowded with the military. On the fourth floor of the Fordham hotel built before Columbus discovered America is Number Ten Bedroom, with a view of the beautiful Rose Window of York Minster. You can see the Rose Window from many angles, but Number Ten Bedroom affords a view over the housetops on a direct level with the Rose Window.

The next morning Miss Vi Farrow, a resident of York, guided me thru the Minster, on the city walls and to see the other interesting sights. The Whitby bus took me to Lockton. In Lockton I was entertained in the hospitable home of Mr. and Mrs. W. H. Child and Miss Mary Child at "Moor Edge," relatives of Miss D. L. Deakin, of Los Angeles.

We took the Whitby bus, hoping to go to Whitby, but the conductor refused to sell us tickets because the bus might be commandeered for the military, and that would leave us stranded at Whitby—rather too far to walk back to Lockton. So we got off at Saltersgate, to see the old fireplace; a turf fire has been burning there for over a hundred years.

Back to Lockton, waiting for the instructions from Pan-American as to the departure of the American Clipper,

on which I had a reservation for the return flight across the Atlantic. Saturday we watched the evacuees arrive. Each with a gas mask, our allotment of a mother and babe did not appear. Saturday night was our first black out. Sunday at 11:15 a. m. we listened to Prime Minister Chamberlain announce a state of war. Sunday afternoon Mrs. Child took me to the air raid warden for my gas mask. Everyone in the community had a gas mask. There were several left for emergency and I was an emergency. All the evacuees had their own gas masks. The wireless announced that the *Athenia* had been sunk. Monday, September 4th, the telegram came via Thornton le Dale, and, gas mask in hand, I took the late afternoon bus for York and the hospitality of Miss Farrow. I had spent two nights with black out in Lockton, and Monday night I experienced the black out in York—town and station. And it was **Black!**

Early the next morning I started for Foynes, Eire, changing at Leeds and Manchester, taking the boat at Holyhead. It was an interesting ride, I enjoyed it. We were delayed, but the boat had waited for us, and was loaded with passengers, many men, women and children returning to the Irish Free State. To avoid submarines, we zigzagged across the Irish Sea which delayed us still more, so by the time we reached Kingstown, Dublin, and Kingsbridge, the last train for Foynes had left. The next train—7:15 in the morning!

I wired Pan-American to tell them I was on my way, and stranded at Kingsbridge, and then I found hotel and a bed for sleep. Many of the passengers remained in the waiting room of the station all night. The station master assured me that this train

was carrying Clipper mail, which encouraged me to think that I might make my departure date. A change at Limerick Junction, then Limerick, and the next train was due to leave for Foynes at two-thirty, but my telegram had said the departure hour for the Clipper was one p. m. The train that carried the sacks of mail was going as far as Ballingrane Junction, so I stayed with the "Clipper Mail" and went as far as Ballingrane Junction. There they told me the bags of mail would be carried by a "goods train," which of course did not take passengers, unless I could persuade them this was an emergency, so I went in to wire again to Pan American, because it was now getting on toward one o'clock. The telegraph operator, Miss Bourke, was a friend in need, giving me milk to drink, biscuits to eat, and the information that the Clipper was not departing until five-thirty. Then, to be sure that I flew the Atlantic safely, she gave me a medal of St. Theresa, that she might drop a rose in my pathway, and bring me safely home. When the "goods train" came—just an ordinary freight train to an American—the station master and Miss Bourke, and the "goods guard" were most kind, and stowed me safely away on the last leg of my journey to Foynes.

Imagine my delight when I found a man belonging to Pan-American in the same caboose. All of the parts were being moved from Southampton to Foynes, as the Clipper base. "*The American Clipper*" was a lovely gray bird on the River Shannon, and probably the most welcome sight I have ever seen. I weighed in, my fifty-five pounds of luggage, with a little overnight bag they provided, and had the rest of the afternoon to see the sights of Foynes. The most interesting was a charming hotel up on a hill, where we had tea,

and hope another time to spend a night.

No ships at sea to give us weather reports, but at seven p.m., with twenty-three passengers, we soared off from the water and into the sunset. Dinner was served and by midnight, we were all tucked into very spacious berths, longer, wider, and roomier than any I have ever been in. The next morning they asked me if I had heard the back-firing of the engine, but I had heard nothing, so decided I had slept soundly.

I woke to see the morning glory of dawn and looked down four thousand feet over the Atlantic Ocean, and thought it is wonderful, we are moving right along! After another nap I was awakened by the steward announcing

that we were landing at Botwood, Newfoundland.

As I looked out and saw land, I thrilled at the thought that we had spanned the Atlantic Ocean safely, and I was grateful to Captain Culbertson and his crew, who could bring us by instruments, without any information from ships at sea. Everybody off, and the plane refueled. Back on the plane we were served breakfast.

Next stop at Shediac, New Brunswick, but only about fifteen minutes, to debark one passenger, and take on clean dishes and more food for dinner. At four o'clock, after flying the length of Long Island we settled easily on the waters at Port Washington.

Foynes yesterday, today New York!

AND HE'S NOT TELLING

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CONSIDER the lowly, downtrod worm :
His walk is a groveling, servile squirm,
He wears no clothes and he bears no fur,
And it's hard to distinguish a him from a her.
Though he passes his days in toiling for us
By making the ground all nice and porous,
We either are quite unaware he is near
And tread him into a dark-brown smear
Or show him our thanks and our warm good wishes
By casting him out to attract the fishes.
But the worm in at least one way is smart,
He can grow at will a replacement part.
If his head's cut off, he can sprout another
As good as the one he got from mother ;
If his tail's detached, a new one will burgeon
Without any help from nurse or surgeon.
Now this is a trick that men of science
Would like to pass on for the use of their clients,
But its secret they ruefully grant is known
To the lowly, downtrod worm alone.
From which it may readily be discerned
That at long, long last the worm has turned.

—RICHARD ARMOUR.

Editorials

Ave Atque Vale

The editor of *The Biologist* lays down his pen with distinct regret after sixteen years of connection with the activities of Phi Sigma, to better be able to carry on a position of trust in the Executive Committee of the College and University Department of the National Catholic Educational Association,—a position which will demand all the spare time and energy available from the duties of a college dean and biology department head.

He began in 1924 as secretary of Zeta Chapter. The next year he was chapter president. In 1926 he was honored with the vice-chancellorship. Four years later he accepted the editorship.

He had the privilege of participating in the constitutional convention of 1925 at Washington, D. C. and has been able to attend every national meeting since that date. He has known and worked with three national chancellors: the late lamented Ira E. Cutler, Paul B. Sears and the present incumbent Paul A. Warren; two Vice Chancellors: Lowell Noland and Melville Hatch; three Secretaries: C. I. Reed, Fanny Fern Smith Davis and A. I. Ortenburger, and throughout all the years the one National Treasurer Erwine Hall Stewart.

To have been a member at all of Phi Sigma was an honor, especially for a Roman Catholic priest and the member of ancient religious order. To have been selected for offices of trust in the chapter and the council was a distinction. To have known and worked with the earnest and enthusiastic young men and women who have made

up the rank and file of Phi Sigma for the past ten years was a pleasure. To have been associated with those sterling, unselfish and self-sacrificing members of the council, who have given so freely of their time and interest that Phi Sigma might live, was a privilege so deeply felt that it cannot be put into words.

Whether it was the native executive ability tempered by a sublime sense of humor of Paul Warren, the stubborn determination and infinite patience of Arthur Ortenburger, or the sterling fidelity of Erwine Hall Stewart,—from each of these gentlemen the editor learned a lot. Mostly it was to admire them for their altruism, their ability to stand up under fire, and their resilience in continuing to carry on for Phi Sigma. This has not always been easy. They have seen the Society through the depression, and through the post-depression restlessness in which so many older and greater organizations foundered.

They have been the "grand old men" of the Society, in terms of service, in wisdom and foresight. Of them Phi Sigma has just reason to be proud.

To all the foregoing and to our faithful printer of *The Biologist* through all these years, Mr. Edward W. Milligan, your former editor expresses his deep, abiding, and heartfelt gratitude.

He trusts that his successor at the editorial desk will be accorded the same hearty cooperation, the same patient understanding, and the same encouraging trust on the part of the Chapters and the Council that have made the past decade a profoundly rich and moving experience.

That Summer School

Again to the editorial desk comes the flock of announcements of summer schools offering special inducements to those interested in special work in Biology. First in importance to the member of Phi Sigma is the Douglas Lake Station of the University of Michigan, under the direction of Dr. George R. La Rue, of the university faculty. It is at this summer station that BETA Chapter offers a scholarship, open to anyone, not necessary to a student at the University of Michigan.

Among other interesting summer places for study and research are the

Iowa State College Botany Summer School, headquarters, at Ames, Iowa; the summer courses at the State College of Washington; the Marine Biological Laboratory at Woods Hole, Massachusetts; the Mountain Lake Biological Station of the University of Virginia; the University of Maine Marine Laboratory at Lamoine; and the University of Washington's Oceanographic Laboratories at Seattle.

The future teacher of any biological subject who neglects any reasonable opportunity to enrich his biological background by attendance at some one of these better known summer schools is remiss indeed.



Chapter News Letters

Beta

—University of Michigan

President—Robert A. Kleemeier, Dept. of Psychology.

Vice-President—Leonard N. Allison, Dept. of Zoology.

Secretary—Betty M. Robertson, Dept. of Botany.

Treasurer—Reed W. Varner, School of Forestry and Conservation.

The officers listed above were elected in March and will be installed at the annual banquet on May 15. Phi Sigma's Silver Anniversary will be commemorated on the same evening.

The Phi Sigma Award for 1940 will be presented to Colvin L. Gibson, of the Zoology Department, by President Alexander G. Ruthven at the annual honors convocation.

Spring initiation of new members will be held May 1. Over fifty candidates have accepted membership in Beta Chapter this year.

ROBERT B. LINDBERG,
Secretary.

Epsilon

—University of Denver

President—George Twombly, 2060 S. Gaylord St., Denver, Colorado.

Vice-President—James Miles, 1002 S. Ogden St., Denver.

Secretary—Byron L. Miller, Jr., 2501 High St., Denver.

Treasurer—Harry Durham, 1939 E. Evans Ave., Denver.

The election and installation of new members will take place in the near future.

The following members will graduate this coming June: William Cormack, Eleanor Knight, David Kramish, Esther Jane Wood. The chapter extends to them the best of luck and hopes that they will retain their active membership by participating in the activities of the chapter.

BYRON L. MILLER, JR.,
Secretary.

Zeta

—University of Wisconsin

President—David G. Frey, Biology Bldg., Univ. Wis.

Vice-President—Marcus I. Wegner, Biochemistry Bldg.

Recording Secretary—M. Alan Sprague, Agronomy Bldg.

Program Secretary—Russell B. Stevens, Biology Bldg.

Treasurer—Irvin Fuhr, Biochemistry Bldg.

Editor—Robert H. Burris, Agricultural Hall.

Zeta chapter welcomed nine new members at the fall banquet held on December sixth. Professor George Wagner acted as toastmaster. In introducing our new honorary member, Professor C. H. Bunting, President Emeritus E. A. Birge traced the development of biological sciences at the University of Wisconsin. Professor Bunting's address, "Investigation," gave us an insight into his concept of research, a concept derived from Professor Bunting's wide experience and tempered by study under some of our country's greatest biologists.

The first meeting of the new year was a departure from the usual program. The chapter sponsored an enjoyable evening of bowling in the Memorial Union.

Our subsequent meetings this semester have been unusually interesting and informative. We have heard Dr. A. Koehler of the U. S. Forest Products Laboratory discuss "Things Trees Tell"; Dr. Aldo Leopold related his ideas on "Ecology and Game Management"; Dr. Arnold Jackson illustrated a lecture on "Diseases of the Thyroid Gland"; and Dr. Churchill Eisenhart explained the uses of statistical methods in biology in his talk, "Correlation Coefficients".

ROBERT H. BURRIS,
Editor.

Kappa

—University of Kansas

President—Harold Smolin, 607 Snow Hall, University of Kansas, Lawrence, Kansas.

Vice-President—Louis J. Lipovsky, 303 Snow Hall.

Secretary—Florence E. Dill, 424 Snow Hall.

Treasurer—Isabelle Baird, 307 Snow Hall.

At the spring initiation banquet held May 1, the Phi Sigma Medal was awarded to Louis J. Lipovsky, Department of Entomology, as the outstanding student in biology for the past year. Mr. C. Bertrand Schultz of the Nebraska Museum, Lincoln, Nebraska, was our guest speaker. Eleven new members were initiated at that time; these represented the Anatomy, Bacteriology, Botany, Zoology, and Physiology Departments.

FLORENCE E. DILL,
Secretary.

Mu

—University of California

President—Robert D. Ray, 1107 Calusa Ave., Berkeley, Calif.

Vice-President—Werner Braun, 1828 Delaware St., Berkeley, Calif.

Treasurer—Angela Capobianco, 65 Culebra Terrace, San Francisco, Calif.

Secretary—Louise F. Lorenz, 3036 Hillegass Ave., Berkeley, Calif.

Since the last National Meeting when Mu Chapter again went on record as desiring a reduction in the initiation fee, many words and a good deal of emotion have been spent over our problem. It is therefore with a great sense of relief that Mu Chapter has settled back into the old familiar pattern of its relationship with Phi Sigma Society. The possibility of withdrawal is definitely vetoed, the suggestions for compromise and local adaptations are eliminated, and we are as we were, Mu Chapter, Phi Sigma Society.

Not that our questioning and investigations were a waste of time at all, nor are they necessarily finished. We still have our problems, but we probably understand them—and ourselves—better than we did, and having failed in one course of action, we will try others.

Though we still have hopes of achieving our ends, we sincerely desire to do so with the least possible obtrusiveness.

In spite of these disturbances, we have had two extremely interesting scientific meetings this semester and hope to widen the scope of these in the future to increase their value to our members.

LOUISE F. LORENZ,
Secretary.

Pi

—Emory University

President—Charles Uhl, Sigma Chi House, Emory University, Georgia.

Vice-President—Frances McCalla, Agnes Scott College, Decatur, Georgia.

Secretary—Jeanne Matthews, 61 Barksdale Drive, Atlanta, Ga.

Treasurer—Dr. H. M. Phillips, 2080 North Decatur Road, Apt. M, Atlanta, Ga.

At a recent banquet Pi Chapter initiated six new members. Following the initiation a representative from the Georgia Wild Life Division gave an interesting talk on the work being done by the Wild Life Division.

On April 8, a meeting was held to which all biology concentration students were invited. Doctor J. E. Scarborough, of the Emory University School of Medicine, presented a paper on "The Biological Effects of X-Ray."

Four additional students have been invited to become members of Phi Sigma and these will be initiated soon. Officers for the new year are to be elected at once.

JEANNE MATTHEWS,
Secretary.

Rho

—University of Illinois

President—Kenneth L. Knight, 303 Entomology Bldg., Urbana, Illinois.

Vice-President—Jane Claire Dirks, 203 Vivarium Bldg., Champaign.

Secretary—Wm. G. Gambill, 204 Natural History Bldg., Urbana.

Treasurer—Thomas H. Lord, 362 Noyes Laboratory, Urbana.

It is hoped that Rho Chapter has at last emerged from the Dark Ages of its history in its fifteenth year of existence. During the past year the incum-

bent officers have taken a more vital interest in the welfare of Phi Sigma Society on this campus than had been manifested for several years. With the coming of the dawn, the loss of a number of "treasures" of the chapter has been discovered and an attempt is being made to recover these.

The National Meeting at Columbus proved a real stimulus to the benighted group. The idea of sponsoring a series of programs for undergraduate students in the biological sciences, such as many of the other chapters present, has appealed to Rho Chapter as a possible means of creating a greater local interest in Phi Sigma Society. The amount of interest taken in this proposed project indicates that it may be put into effect during the coming school year.

During the past year, five faculty and thirty active members have been initiated into this chapter. These represent the Bacteriology, Botany, Entomology, and Zoology Departments. One member has been received as a transfer from the Bacteriology Department of Montana State College (Chi Chapter).

It is a pleasure to announce the election of Dr. John T. Buchholz, Head of the Botany Department of the University of Illinois, to honorary membership in Phi Sigma Society. Dr. Buchholz has done outstanding work in the fields of plant morphology and embryology, phylogeny of conifers, pollen-tube growth and genetics of *Datura*, evolution, and genetic effects of radiation. He will be initiated into the society early in May when the spring initiation dinner for members-elect is held. Dr. Buchholz will be the guest of honor on that occasion as well as the speaker of the evening.

JANE CLAIRE DIRKS,
(Retiring) Secretary.

Sigma

—University of Florida

President—Lewis Marchand, University Station, Gainesville, Fla.

Vice-President — Kenneth Swinford, School Forestry, University of Fla., Gainesville, Fla.

Secretary—Wilber DeVall, School Forestry, University of Fla.

Treasurer—Coleman Goin, Dept. of Biology, University of Fla.

Since the last News Letter, Sigma chapter has initiated five candidates into membership. Those who became members were: Mr. J. C. Driggers, graduate student in Poultry Nutrition; Mr. Patrick T. Hunter, graduate student in Agriculture; Mr. Charles D. Kime, Jr., graduate student in Soils; Mr. Dale Leroy Kinsley, graduate student in Pharmacognosy and Miss Frances E. Norman, graduate student in Genetics.

The initiation banquet was held at the Whitehouse Hotel in Gainesville in conjunction with the Florida Entomological Society. After the dinner, all in attendance enjoyed several reels of motion pictures taken in Mexico by Professor J. R. Watson, head of the department of Entomology at the Experiment Station.

Sigma chapter was represented at the National Convention by K. B. Swinford, Teaching Fellow in the School of Forestry at the University of Florida. His report of the convention, upon his return, showed the exceptionally fine progress being made by the National Organization.

Several members of the biology and botany departments spent the Christmas holiday period on an extended trip into Mexico. A log of happenings and outstanding points of interest was presented to the local chapter at its January meeting.

Sigma chapter has adopted the policy of having, in addition to its regular meeting, a bi-monthly, outdoor meeting. The second of this series took place on February 24th in the form of a picnic and 'possum hunt. A fine supper was provided followed by a safari into the adjoining woods with hounds. The trip netted its party a bag of two 'possums.

A special feature of Sigma chapter's educational program was a colored movie on "The Foetal Movement of Bats and Pouched Opossums", presented by Dr. D. S. Pankratz, a noted authority in this field. This program was presented to members of Phi Sigma, faculty and guests.

On March 12th, Sigma chapter and A. E. D. (Pre-medical society), jointly sponsored a free lecture on "Teratology" by Dr. Otterbein Dressler of the Philadelphia College of Osteopathy. As a joint meeting of the two societies, it was a great success. Such a spirit of

cooperation among local societies has proven very advantageous in furthering visiting lecturers on the campus at the University of Florida.

Sigma chapter is now planning for its second annual spring BIO-QUEST at which time swimming and other sports events will be featured in the afternoon followed by a campfire supper. The evening program is to consist of the installation of new officers and initiation of new members supplemented by the fun-for-all BIO-QUEST.

W. B. DE VALL,
Secretary.

Tau

—Duke University

President—Charles Wilson.
Vice-President—Joseph McDermott.
Secretary—Rose Kueffner, 1022 Urban Avenue, Durham, North Carolina.
Treasurer—Edyth Hull.

Tau Chapter of Phi Sigma held a meeting on March 26 in the Biology Building of Duke University. Joseph McDermott and Charles Boyer gave interesting accounts of their research problems. Officers were elected to serve for the term of 1940-41.

ROSE KUEFFNER,
Secretary.

Upsilon

—Miami University

President—James Howell.
Vice-President—Arthur Evans.
Recording Secretary—Jean Allen.
Corresponding Secretary—Robert Rech.
Treasurer—Louis Spriestersbach.

On March 21 Upsilon Chapter of Phi Sigma initiated twenty-one new members. After the initiation, the group enjoyed an excellent banquet. The chapter was particularly fortunate in being able to obtain as speaker for the evening Dr. John H. Hoskins, Paleobotanist of the University of Cincinnati. He presented a series of lantern slides, supplemented by lecture, on the "Fossil Plants of the Early Geological Ages".

On April 11, Upsilon Chapter had its annual election of officers.

Upsilon Chapter closes another interesting and successful year. May next

year be a bigger year for Phi Sigma Society!

ERNEST SONS,
(Retiring) Corresponding Secretary.

Phi

—University of New Hampshire

President—Stuart Dunn, Botany Dept., University of New Hampshire, Durham, N. H.
Vice-President—Philip Couture, Entomology Dept., University of New Hampshire, Durham, N. H.
Treasurer—Joseph Stone, Student Cooperative, Durham, N. H.
Recording Secretary—Louisa Stuart, 71 Madbury Road, Durham, N. H.
Corresponding Secretary—Eleanor L. Sheehan, Zoology Dept., University of New Hampshire, Durham, N. H.

Phi Chapter of Phi Sigma has been holding its meetings in Nesmith Hall, the new home of the recently founded Biological Institute. There have been many interesting and stimulating papers including *Leukemia* by Archibald Ramage, *The Distribution of Birds in the White Mountains* by Maurice Provost, *Notes on the Odonata of New Hampshire* by Richard Beattie, *Sulphanilamide* by Paul Shaw, *Sleep* by Martha Holt, *Acrylic Resins* by Patrick Fitzgerald, *Current Articles of Scientific Interest* by Erma Andrews, and *The Honey Bee* by Josephine Taub. At one meeting Professor C. Floyd Jackson, Dr. Charles Bortorff, and Robert Blickle showed Kodachrome slides of biological and general interest.

There have been two social parties, one at Christmas time when gifts were exchanged and another on Valentine's Day when appropriate verses and sentiments were exchanged.

The annual Pre-medical Night, an open meeting, was held on February 22nd with an unusually large number of guests. The speaker of the evening was Dr. MacLean Gill of Concord, N. H. His talk aroused a lively discussion on socialized medicine.

Martha Holt, Patricia Mac Martin, Archibald Ramage, Paul Shaw, and Louisa Stuart are attending the Connecticut Valley Student Scientific Conference at Dartmouth College on April 13th as student representatives of this chapter.

Phi Chapter is planning to participate actively in the Student Biological Conference being held at Tufts College on April 20th. The following members will read papers: Richard Beatie, Patrick FitzGerald, Maurice Provost, and Paul Shaw. A number of other members will attend the conference.

On Sunday, April 14th, a supper meeting will be held at the New Hampshire Outing Club cabin at Mendams Pond.

The program for the rest of the year includes the initiation of the pledges, paper meetings, and a mountain trip. Plans are already being made for Phi Chapter to participate in the 75th Anniversary Celebration of the University of New Hampshire. Phi Chapter will also celebrate its own Silver Anniversary as a campus honorary society next year.

ELEANOR L. SHEEHAN,
Corresponding Secretary.

Psi

—University of Washington

President—James Dawson (Botany Department), 316 Johnson Hall, University of Washington, Seattle, Washington.

Vice-President—Joseph Trainor (Zoology Dept.), 219 Johnson Hall, University of Washington.

Secretary—Eloise Kuntz (Zoology Dept.), 221 Johnson Hall.

Treasurer—Helen Kipple (Physiology Dept.), 206A Physiology Hall.

At the March meeting election of officers was held and Dr. Rigg of the Botany Department gave a very interesting discussion of "Neriocystis and Its Relation to the Other Sciences".

Sixteen new members were initiated in January.

For the April meeting we will have a symposium on Organic Evolution, conducted by Dr. Norris of Biochemistry, Dr. Guberlet of Embryology, and Dr. Ray of Anthropology.

ELOISE KUNTZ,
Secretary.

Omega

—University of Oklahoma

President—Marcelotte Leake, Botany Dept., Univ. of Okla.

Vice-President—Minnie Jean Matthews, Zoology Dept., Univ. of Okla.

Secretary—Dorothy Rainwater, Botany Dept., Univ. of Okla.

Treasurer—Elmo Bonifield, Zoology Dept., Univ. of Okla.

Following the initiation ceremony, November 24, 1939, a banquet was held. Dr. J. C. Shirley, of Phillips University, Enid, Oklahoma, addressed the members and honorees on "A Naturalist Among the Redwoods".

At the Dec. 6, meeting Dr. J. M. Thuringer of the Oklahoma Medical School spoke to the members on "Recent Advances in the Study of the Tubercle Bacillus".

Feb. 7, Dr. C. G. Laliker, of the Geology Department spoke on "Practical Applications of Foraminifera". A spring calendar of activities was presented to each member.

Feb. 10, a Valentine party was held at the City Park Lodge.

On March 5, Dr. C. N. Gould was the speaker; his subject was "Life Zones and Flora of National Monuments in the Southwest".

New officers for the year 1940-41 were elected March 27. They are: President, Marcelotte Leake; Vice-President, Minnie Jean Matthews; Secretary, Dorothy Rainwater; Treasurer, Elmo Bonifield.

They were installed at the regular Wednesday evening meeting on April 3. Dr. Milton Hopkins, of the Botany Department spoke on "The Herbaria of the World". Dr. Hopkins has traveled widely and his lecture proved most delightful.

Initiation for the following new members is to be held May 1: Kathryn Beck, Phil Fife, Stanley Meeks, Al Newberry, Edwin Rogers, William Thompson, and Elizabeth Trent of the Zoology Department; Frances De Vorss of Applied Biology; and Tillman Johnson, of the Botany Department. On May 3-4 the new members are to be entertained by the society at the spring meeting of the Oklahoma Academy of Science which is to be held at Locust Grove, Oklahoma.

DOROTHY THORNTON RAINWATER,
Secretary.

Alpha Epsilon

—University of Pittsburgh

Three of our Alpha Epsilon members have been appointed to new positions. Mr. Philip Walker, our president, has been appointed as Naturalist at Riverview Park, Pittsburgh. Mr. Charlesworth, our Vice-President, and Mr. Charles Hepner have been appointed Florists, at Phipps Conservatory, Schenley Park, Pittsburgh.

Miss Daisy Mastrotto is the recipient of our Scholarship medal. It is being presented to her today, March 4, at the Scholars' Day Program. Dr. Christian Gauss, Dean of the College, Princeton University, is the guest speaker. Sixteen Honorary fraternities are tapping members. Thirteen special awards and scholarships are being presented. This afternoon the Womens Self-government Association will sponsor a tea in the Commons Room for all members of honorary fraternities, together with their faculty advisers and tappees.

At present we are trying to encourage our members to contribute articles for the *Biologist*. To date every one keeps saying I have nothing ready to present.

Alpha Eta

—Oklahoma A. & M. College

President—Harold Winters, 315 Hanner Hall, Oklahoma A. & M. College, Stillwater, Oklahoma.

Treasurer—Stephen Butler, 323 Hanner Hall.

Vice-President—Alexander Wiederkehr, 912 West 6th.

Secretary—Jo Ann Pronine, 402 Elm.

Alpha Eta Chapter has had an unusually successful year in spite of the fact that it had a slow start at the beginning of the year because the vice-president and secretary elected last spring failed to return to school this year.

Our program theme for the year has been on the various phases of wildlife conservation, and several excellent programs have been given on this subject. Dr. Clifford Shirley of Phillips University spoke at the fall banquet on "The Redwoods". The spring banquet will be held on April 14.

Thirty-seven active members and five

faculty members have been initiated during the year.

HAROLD WINTERS,
President.

Alpha Iota

—Bucknell University

President—Richard C. Snyder, Sigma Chi House, Lewisburg, Pa.

Vice-President—Cornelius Roughgarden, N. 6 St., Lewisburg, Pa.

Secretary—Naomi Heritage, Ziegler Infirmary, Lewisburg, Pa.

Treasurer—Barbara Ludwig, Women's College, Lewisburg, Pa.

Since the last news letter went to press, Alpha Iota has been enjoying an active and profitable season. The annual fall picnic attracted about fifty biologists to the Bucknell Recreation Center early in November, and many new students had the opportunity to learn about the requirements of the society at that time.

At the National Meeting at Columbus, Ohio, Richard C. Snyder represented the chapter. Two research papers, "Observations on the Leucocytes of the Earthworm" by Miss Janet Clayton, and "The Mosquitoes of Union County with Notes on their Habits" by Cornelius Roughgarden, were read by title, and one paper on "The Relation of Bird Migration to Topography in the State of Pennsylvania" was read by the author, Richard Snyder.

The January meeting featured the well-known lecturers, Constance and Wesley Mueller, with their fine technicolor motion picture entitled "Blue-green Water". This highly successful film is a picturization of the bird, animal, shore, and undersea life of the Florida Keys and the Bahama Islands, and it must be said that the large audience was impressed with the beauty, detail, and organization of the film.

Dr. Leonard Bush, assistant surgeon at the Geisinger Memorial Hospital in Danville, Pa., favored us with an illustrated talk on surgery at the February meeting. His films dealt with methods of treating hip fractures, applying walking calipers in plaster casts, and the treatment of empyema. Many questions applying to the prospective surgeon's preparation were discussed by the group following the lecture.

The March meeting was devoted to an illustrated presentation on the "Development of the Appalachian Moun-

tain" by Mr. Louis C. Peltier, Professor of Geology at Bucknell.

The eleven pledges of the chapter are in the midst of their introduction to research. While their findings are as yet unknown, quality is shown in every phase of their work.

RICHARD C. SNYDER,
President.

Alpha Kappa

—Hunter College

President—Mildred Maisler, 1665 Townsend Ave., Bronx, New York City.

Vice-President—Sophie Berck, 1521 Fulton Ave., Bronx, New York City.

Secretary—Mildred Spector, 1871 Harrison Ave., Bronx, New York City.

Treasurer—Edith Meyer, 531 E. 78th St., New York City.

Alpha Kappa Chapter has undergone a most spirited renaissance due in large measure to the splendid impetus and inspiration given us through our trip in December to Columbus, Ohio, on the occasion of the National Meeting.

For two years prior to this date, our chapter had been inactive, its lull broken only by the semi-annual initiation dinners that were held for the induction of new members. We were beginning to feel that our Phi Sigma chapter was becoming the tired old man of the honorary societies of the college. Not so after we returned from the convention. The unremitting efforts of the National Council soon showed us that we were not receiving the full measure of the pleasures and benefits that were an integral part of Phi Sigma membership.

Since the new year we have held three meetings, the first two of which were organizational in character. Publicity, Social and Program Committees were appointed with the aid of the many helpful suggestions made to us by the other chapter delegates at the recent conference.

One of our innovations of which we are most hopeful is the writing of a pamphlet describing Phi Sigma aims and ideals to be distributed to all incoming science students at the college. We feel that these people should be familiar with our organization early in their academic careers so that they may work toward the goals set forth in the description.

From September onward all new

candidates will be required to submit a paper for entrance so that we may do away with the purely "honorary" aspect that Phi Sigma at Hunter College has so far been accustomed to.

At present we are holding a series of interlocking lectures on the endocrines. Miss Anita Zorzoli, a Phi Sigma member engaged at present in active research, has spoken to us on some new aspects of the pituitary; Dr. A. Charkelis of the College of Physicians and Surgeons and the College of the City of New York will speak in April on the Sex Hormones. We are also pleased to announce that at our forthcoming dinner, Dr. W. L. Robbins of the New York Botanical Gardens will speak on Plant Hormones.

Our last dinner was signally honored by the presence of Dr. Selig Hecht, who gave us interesting information on the Chemistry of Vision.

There is a group at Brooklyn College in New York which desires to affiliate with Phi Sigma Society. Very shortly when things are well under way we are going to invite their representatives to one of our meetings. I am sure that we cannot help but communicate our new zest to them.

In conclusion I wish to say that the decisions made at the convention were warmly received by our membership.

GERTRUDE SILBERMAN.

Alpha Lambda

—University and State College of Oregon

On March 9, 1940 the Alpha Lambda Chapter of Phi Sigma held its annual initiation banquet and dance at the Newhouse Hotel in Salt Lake City. Mr. Stephen D. Durrant of the Zoology Department acted as Master of Ceremonies. Dr. R. V. Chamberlin, head of the Zoology Department of the University of Utah, was a special guest. Several members gave short talks during the banquet, which was followed by dancing.

On March 27, 1940 a special meeting was called for the purpose of electing new officers for the coming year. The following were elected and assumed office. Keith R. Kelson, President; Marie Lettieri, Vice-President; Lewis Nielsen, Secretary; Patricia Dougall, Treasurer.

During the same meeting plans were

begun for the spring outing. This is to be held at the Bear River Bird Refuge for migratory birds located near the northern end of Great Salt Lake, Utah.

BLAINE C. TAYLOR,
Secretary.

Alpha Mu

—University and State College of Oregon

President—Don Marcy, Dept. Zoology, Oregon State College, Corvallis, Oregon.

First Vice-President—Dr. Ethel Sanborn, Dept. Botany, Oregon State College, Corvallis, Oregon.

Second Vice-President—John Pierson, University of Oregon Medical School, Portland, Oregon.

Secretary—Helen Lockren, 439 South 15 Street, Corvallis, Oregon.

Treasurer—Maxwell Doty, 330 S. 15 Street, Corvallis, Oregon.

Alpha Mu Chapter held an initiation service December 13 for four new members. The speaker of the initiation banquet was Mr. Henry P. Hansen of the Botany Department. Mr. Hansen spoke on the sequence of forest trees as revealed by work he has done on pollen analysis of the bogs of the Pacific Northwest.

On February 13, Phi Sigma met jointly with the local group of Phi Beta Kappa for a symposium on Science and Religion. Dr. Alfred Taylor of the Zoology Department spoke for science; Dr. O. R. Chambers of the Psychology Department, for religion. After an animated discussion the conclusion was reached that there should be no conflict.

HELEN LOCKREN,
Secretary.

Alpha Nu

—University of New Mexico

President—Robert Spensley, 529 N. Hermosa, Albuquerque, New Mexico.

Vice-President—Edward Kijenski, 824 Forrester.

Treasurer—Robert Buckey, 1635 E. Roma.

Secretary—Mary Dunn Jamison, 1800 W. New York.

At the March 7 meeting, election of officers for the year 1940-41 was held. Eight new members were also elected

at that time. On April 18, they will be formally initiated at a banquet.

At the regular meetings the following speakers were on the program:

Dr. A. E. Borrell of the Soil Conservation Service: "Birds of New Mexico".

Dr. E. F. Castetter: "Tobacco and Smoking".

Dr. J. D. Lamon: "Ruptured Appendices".

MARY DUNN JAMISON,
Secretary.

Alpha Xi

—Rhode Island State College

President—Louis Stringer, East Hall, R. I. S. C., Kingston, R. I.

Vice-President—Natalie Whiteford, Delta Zeta House, R. I. S. C., Kingston, R. I.

Secretary—Virginia Hornby, R. I. S. C.

Treasurer—Henry Weiss, East Hall, R. I. S. C.

Sixteen undergraduates, one graduate student, and one faculty member have been initiated into Phi Sigma this year.

One of the most interesting meetings of the year took place February 8, when Nestore Caroselli, a graduate student, gave an illustrated lecture on "Bleeding Canker of Maples". This material had been presented by him at the A. A. A. S. meeting held in Columbus, Ohio, last December. Mr. Caroselli has done his research under the direction of Dr. Frank L. Howard, a member of Phi Sigma.

Student papers have been read before the chapter by nine of the members. Many of these reports were the results of active research.

A group of members attended an all-day biological conference at Tufts College, Massachusetts, on April 20. Henry Weiss, Saul Barber, and William Banfield read papers at this conference on the research they have done this year together with other students.

THE CELL, annual publication of Alpha Xi Chapter, will make its appearance at the annual banquet May 15. Virginia Hornby is editor-in-chief. Her staff includes Carl Anderson, associate editor; Dorothy MacLaughlin, art editor; Maurice Leon, alumni editor; and Henry Weiss, business manager.

Dr. Michael Di Maio of Rhode Island Hospital, a charter member of Alpha Xi, will be the guest speaker at the banquet.

VIRGINIA F. HORNBY.
Secretary.

Alpha Omicron

—Marquette University

President—Joseph J. Wocasek.

Vice-President—Arno F. Michaelis.

Treasurer—Laverne Penn.

Recording Secretary—Marjorie Artus.

Corresponding Secretary—Norman C.

Olson, 2111 N. Booth St., Milwaukee, Wisconsin.

On Sunday afternoon, February 11, our chapter held its annual public address in the Marquette Medical School auditorium. The chosen speaker was Dr. William N. Steil, Head of the Department of Biology at Marquette, who talked to an audience of several hundred people on "Research: The Worker and His Contributions to the Field of Biology". It was an inspiration to all who attended. Dr. Steil was introduced

by Dr. Wm. H. Atwood, formerly president of Zeta chapter.

Eleven new members were elected into our chapter of Phi Sigma Society this semester. They will be initiated at our annual banquet on the first Sunday in May. The guests of honor at this banquet will be Dr. and Mrs. William N. Steil.

Some of the research work being done by our members is as follows: Joseph Wocasek, biochemical aspects of water purification; Laverne Penn, biological effects of colchicine; Marjorie Artus, mycorrhizae of *Aesculus hippocastanum*; and Eugene Kampmann and George Becker, preparation and utilization of sex hormones.

In concluding this report, it is fitting to pay a tribute to our past president, Mr. Hermann L. Karl. Due to illness he was unable to attend the great majority of our meetings, but his sound advice and optimistic attitude are largely responsible for the successful year just past.

NORMAN C. OLSON,
Corresponding Secretary.



Chapter Initiates

BETA—UNIVERSITY OF MICHIGAN.

January 10, 1940:

Jacob Henry Fischthal, Guila Frances Beattie, Newton B. Everett, Mildred K. Funk, William James Gilbert, Nathan Mory Glaser, Sarah Ethelyne Grollman, Esther L. Gross, Stephen Pinckney Hatchett, Frances Voorhees Hubbs, Donald D. Kinsey, Lyla Bechtel Klee-meier, Stanley Levey, Stanley Marcus, Robert Franklin Patton, Horace Floyd Quick, Morris Rappaport, William Rutherford, John B. Sarracino, Fred John Schwind, Alice Louise Stebbins, Walter Robert Sylvester, John William Thomson, Samuel Waldfogel, Boyd Wallace Walker, Milton Wigod.

May 1, 1940:

Robert Anderson, Stephen Clement Cappannari, Olga Eugenia Dobosz, Gustav Robinson Gregory, Estelle Griffiths, Arnold Louis Mignery, Sidney Mittler, Alice Linnea Maria Nelson, Donald Bruce O'Brien, James Preston Parker, Penelope Mackey Pearl, Amster Dudley Roberts, Janet Erbe Roomhild, David Lincoln Spencer, Theodore Tsunohiro Tomita, Ruyu Frances Wang, Raoul Lewis Weisman, Harry Hammond Wilcox, Jr., Stanley Eugene Wimberly, Orville Luverne Zeeh, Norma Greenhouse, Abraham Leon Rosenzweig, Wimburn Leroy Wallace, Russell T. Woodburne.

EPSILON—UNIVERSITY OF DENVER.

January 21, 1940:

Harry Blaine Durham, Jr., Delbert M. Lobb, James Bernard Miles, Byron L. Miller, Jr., George Curtis Twombly.

ZETA—UNIVERSITY OF WISCONSIN.

December 6, 1939:

Charles Henry Bunting (Honorary Member), Olaf Torstveit, Osborne James Attoe, Samuel Waxler, Joseph Richard Wagner, Shirley Hugh Barker, Theodore William Conger, Lloyd Everett McDaniel, Jay Donald Andrews, Robert Harry Andrew.

ETA—UNIVERSITY OF AKRON.

November 19, 1939:

Joseph Herschkowitz, George Herman Twickler, Raymond Joseph Barrett, George Anastos.

April 25, 1940:

Robert Lawrence Burton, William Cornell Baird, Betty Jean Frick, William B. Rogers, Jr.

KAPPA—UNIVERSITY OF KANSAS.

November 2, 1939:

Leo Aloysius Hellmer, Herbert Haynes Humphreys, Tyson Harvey Mailen, Harold Jay Smolin, Eugene Ellis Kenaga, Louis Cornelius Kuitert, Isabelle Baird, Louis John Lipovsky, Frank Victor Kalich, Leo Herbert Franklin, Russell M. Jeffords, Curtis V. Packard.

April 24, 1940:

Robert Sumner Lockwood, Dan Longston Berger, Francis Milton Spencer, Robert Lee Schmidt, Florence E. Dill, Thomas Grover Orr, Jr., Victor George Henry, Jr., Pat Antony Barelli, Harold Garwood Nelson, Ira Gilman Collins, Moses Pfefferbaum, Claib B. Harris.

LAMBDA—UNIVERSITY OF MONTANA.

February 20, 1940:

Irvin Victor Anderson, Lester A. Colby, Willard Wesley Olson, Jean Margaret Krebsbach, Stanley Richard Ames, Ruth Florence Weise, Robert Lee Bowman, Fay Goodcell Clark, Mary Shull Lemire.

PI—EMORY UNIVERSITY.

February 26, 1940:

Goodwin M. Breinin, Julian Trueheart Darlington, Cornelius Whittelsey Gates, Isaac Newton Hayes, Hattie Gere Jenkins, Cecil Reid Reinstein, William Mark Watkins.

RHO—UNIVERSITY OF ILLINOIS.

December 14, 1939:

William Gray Gambill, Jr., Gorden Wilbur Hasse, George Neville Jones, Elmer Joseph Koestner, Clifford Ladd Prosser, Garland T. Riegel, Tilden Wirt

Roberts, Kathryn Martha Sommerman, John Murray Speirs, Otto William Tie-meier, Oswald Tippo, Lynferd Joseph Wickerham.

May 8, 1940:

Abe Anellis, Louis A. Astell, Ann Marie Brosnahan, John Theodore Buchholz (Honorary), Elizabeth Brown Chase, Herman Burleigh Chase, Charles H. Clemensen, Carl John DeBoer, Joseph Patton Fulton, Ben Greenwood, Hugh Hanson, Noel Benard Heyrend, Harry Hoogstraal, Chester Warren Houston, Robert Ching Lam, John Edgar Larsh, Jr., William Clarence Leavenworth, Betty Jean Leggett, June Luis Littrell, Nelson Leonard Lowry, Walter Joseph Majewski, Robert Lee Metcalf, Mary Helen Phillips, Richard Newton Roerig, Martin Rosoff, Herbert F. Schoof, Wilson Nichols Stewart, Charles Melvin Vaughn, Arthur Harper Webb, Glen Chisholm Weber, Roger Wright Williams, Robert Irby Wise, Robert Gordon Yapp.

SIGMA—UNIVERSITY OF FLORIDA.

November 17, 1939:

James Clyde Driggers, Patrick T. Hunter, Charles Davidson Kime, Jr., Dale Leroy Kinsley, Frances E. Norman.

TAU—DUKE UNIVERSITY.

December 6, 1939:

Alice Gwyn Davis, Mychyle Wellington Johnson, Ernest Adelbert Bickell, Audrey Elizabeth Conrad, James Rankin Duncan, Earl Leroy Emory, Aaron Bascom Hardcastle, Edyth Maud Hull, James Barber Krause, Rose Goldsmith Kueffner, Bernice Elizabeth Lane, Hugh Kennedy Myers, Richard John Stull, Thressa Dale Sutton, Edward H. Walter, Daniel T. Watts, Thomas Hugh Wetmore, Charles Christopher Wilson.

UPSILON—MIAMI UNIVERSITY

March 21, 1940:

Eleanor Margaret Alderman, Jean Allen, Albert N. Appleby, Girard John Brennenman, Nellie Elizabeth Brinnon, Ann Elizabeth Calvert, Robert Dettmerman, Arthur Thompson Evans, Jr., Morris Fox, Phyllis Jane French, James Theodore Howell, Herman Kenneth Lautenschlager, William A. McClellan, Robert William Rech, Bernice Lee Shepard, Edward Arthur Shorten, Jack Irwin Smith, Louis J. Spriestersbach,

Robert Pierce Stafford, Joseph Waldo Wiant, Edith Wiedman.

PHI—UNIVERSITY OF NEW HAMPSHIRE.

November 8, 1939:

Erma Louise Andrews, James Richard Beattie, John Tyler Chadwick, III, Patrick Joseph FitzGerald, Frederick Warren Garland, Jr., Eleanor B. Hillier, Martha Holt, William John Jahoda, William George Keach, Jack William Kirk, Marion Patricia Mac Martin, Michael Alphonse Pieciewicz, Maurice Wilfred Provost, Archibald Plenderlieth Ramage, II, Paul Sleeper Shaw, Richard Thomas Snowman, Francis Augustine Spellman, Josephine Lucille Taub, Raymond Sheldon Wood.

CHI—MONTANA STATE COLLEGE.

December 7, 1939:

Shirley Nyman, Maurice R. Hilleman, John Lewis Welch, Elwin Everett Bennington, Elizabeth Mary Carter.

March 24, 1940:

Richard Herbert Foote.

PSI—UNIVERSITY OF WASHINGTON.

January 25, 1940:

Charles Frederick Cleaver, Joseph Byron Traner, Ervin Fredrick Dailey, James Robert Dawson, Earl Eldred, Richard Fredric Foster, John T. Gharrett, James DeFrees Hauschildt, Hugh H. Hotson, Helen Marie Kipple, Edward Krupski, Earl Junior Larrison, James S. Martin, Camile J. Pertuit, John Gordon Peterson, Victor Philip Seeberg.

OMEGA—UNIVERSITY OF OKLAHOMA.

November 24, 1939:

Nicolo Austin, Arthur Dewey Buck, Hazel Carver, Charles L. Coates, Elizabeth Crain, Sister Mary Martina Demmer, Orie Jacob Eigsti, Mary Linn, Dobson, Marcelotte Leake, Clifton Dancy Govan, Jr., Minnie Jean Matthews, Leo W. Mericle, Eugene Reeves, Frank A. Rinehart, John Warren Saunders, Donald Elvin Savage, Leona Ora Schnell, Milton Schwartz, Ralph Emerson Smith, John Mark Walker.

May 1, 1940:

Kathryn L. Beck, Frances Evelyn DeVors, Phil Raymond Fife, Tillman Joseph Johnson, Stanley W. Meeks, Aubert Jairy Newberry, Jr., Thomas Edwin Rogers, William Best Thompson, Mary Elizabeth Trent.

ALPHA ALPHA—UNIVERSITY OF
SOUTHERN CALIFORNIA.
May 12, 1939:

William Dwight Pierce (Honorary).
February 9, 1940:

William Charles Atkinson, Thomas Adams Burch, Louise Arline Harrison, Jean Moyes Knox, Edith A. Kraeft, Lyle Walter MacIntyre, Bromley Morgan Mayer, Arnold Christoph Von Der Lohe.

ALPHA EPSILON—UNIVERSITY OF
PITTSBURGH.
March 8, 1940:

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April 14, 1940:

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New Books

The thumbnail sketches of current biological literature appearing in this section are not meant to be exhaustive or deeply critical. They aim to survey the rapidly growing field of biology. Naturally these reviews represent the candid opinions of various readers not necessarily those of members of the National Council, nor even those of the Editor.

BASIC COURSE IN BOTANY, RAYMOND J. POOL, *Ginn & Company, Chicago, 1940. \$3.75.*

This new botanical text-book arrives on the field of science-teaching as the ripened fruit of thirty-five years of practical experience on the staff of the University of Nebraska. The result is worth waiting for twice as long. The book follows the more typical arrangement of discussing the physiology and morphology of roots, stems, leaves, flowers, fruits and seeds before embarking on the survey of the plant kingdom. There are also chapters on plant ecology, pathology, heredity and evolution. The illustrations are plentiful, large and clear, as well as many of them original. Despite the fact that there are so many textbooks on the market which conform to the standard types as much as this one, there seems to be ample justification for the author's presenting this new treatment. He has kept the natural history ideal before his mind throughout the writing of the work.

COMPETITION AMONG GRAINS, N. JASNY, *Food Research Institute, Stanford University, Cal., 1940. \$4.00.*

While this book is more economic than biological in its outlook, it will, nevertheless, be of interest to cereal grain producers, to agronomists, and to ecologists in general. Its main theme is competition among the five main cereals, wheat, rye, barley, oats and corn, to the exclusion of rice. This is omitted because it is not a real competitor, needing both high temperatures and excessive water, two factors not possible in the ecology of the other grains.

A CONTRIBUTION TO THE HERPETOLOGY OF FLORIDA, ARCHIE F. CARR, JR., *University of Florida Library, Gainesville, 1940. \$2.25.*

This new work is a monograph, constituting the first number of the third volume of the University of Florida's Biological Science Series. It is comprehensive in its inclusion of a number of interesting backgrounds and sidelights of an ecological nature. These include a discussion of the derivation of the state's fauna, its habitat distribution, as well as the keys for identification, and the annotated list of the amphibia and reptilia of the region. This valuable monograph is a good example of what this country needs on an organized basis,—a study of each of the phyla and phyta for every state in the Union. Once we have these we shall have laid the foundation for a comprehensive and distinctive flora and fauna of the nation.

THE CONTROL OF ORGANISMS, FREDERICK L. FITZPATRICK, *Teachers College, Columbia University, New York, 1940. \$2.75.*

This is the third volume issued in "The Science in Modern Living Series" which is being put out by the bureau of educational research in science of Columbia University Teachers College. It is a logical successor to the first two volumes in the series and with them forms a trilogy on conservation material for science teachers. The books are not texts in themselves, rather they are source-works for background reading, and as such will form interesting reading for the intelligent layman. The present volume more specifically deals with the opportunities Nature offers man to control her resources in his

own interests. In his concluding chapter the author offers as his solution the balanced community.

CULTURAL AND NATURAL AREAS OF NATIVE NORTH AMERICA, A. L. KROEBER, *Univ. of California Press, Berkeley.*

One of the most outstanding and favorably known anthropologists in this country has finally produced a work which was begun in 1931 and has been brought down to date so clearly that it constitutes the latest word in the questions which arise out of, and revolve around, the various areas of cultural intensity and climax among the American Indians. The basis on which the work is organized is the environmental and historical relationship of the various cultures.

DESERT WILD FLOWERS, EDMUND C. JAEGER, *Stanford University Press, Stanford University, California, 1940. \$3.50.*

Anyone who is familiar with Dr. Jaeger's previous work, "The California Deserts", will want to own a copy of this attractive manual, particularly if any time or interest has been devoted to the western deserts, there is this difference between the books, however. The former was a general treatment of the deserts and their population. This present work is a manual of the wild flora of the desert areas. Some 764 species in some seventy odd families are described, and, best of all, well illustrated either by photographs or, for the most part, by naturalistic line engravings. While the book is frankly designed for the layman, one wishes that the author had not omitted the initials of the taxonomic authorities for the species described and pictured.

ESSAYS IN POLYNESIAN ETHNOLOGY, ROBERT W. WILLIAMSON, *Cambridge at the University Press, Macmillan Co., New York, 1939. \$7.00.*

Dr. Williamson was, during his lifetime, an authority on Polynesia whose published works commanded the respect of all workers in the field. Since his death his manuscripts have been published until there remained only a number of more or less topical essays. These have now been collected and edited by Dr. Ralph Piddington of the University of Aberdeen, who has also

contributed an interesting analysis of recent studies in Polynesian history. The book as a whole is well illustrated, and there is a map of the region.

FUNDAMENTALS OF BIOLOGY, ARTHUR W. HAUPT, *McGraw-Hill Book Co., New York, 1940. \$3.00.*

This is the third edition of a textbook which has gained for its clear exposition, interesting presentation, and rigid restriction of material to the most essential and basic facts. The newest revision will win it new friends and keep the old ones.

LABORATORY DIRECTIONS FOR GENERAL BIOLOGY, ARTHUR W. HAUPT, *McGraw-Hill Book Co., New York, 1940. \$1.00.*

One hundred laboratory exercises revised to accompany the textbook also reviewed in this issue.

LIVING SPECIMENS IN THE SCHOOL LABORATORY, *General Biological Supply House, 761 E. 69th Place, Chicago, 1940. \$1.00.*

No teacher is too poor to afford to be without this valuable adjunct to a live course in zoology. It is not a very pretentious production,—somewhat between a large pamphlet and a small monograph,—but it contains a wealth of information on the maintenance of living forms to illustrate biological principles,—the direct antithesis of what William Morton Wheeler was wont to call "the dry rot of academic biology".

MAMMALIAN GENETICS, WILLIAM E. CASTLE, *Harvard University Press, Cambridge, 1940. \$2.00.*

MANUAL FOR A LABORATORY COURSE IN GENETICS, WILLIAM E. CASTLE, *Harvard University Press, Cambridge, 1940. \$0.40.*

Anyone who is looking for a short, introductory course in genetics, with laboratory exercises to accompany, will find in these volumes a satisfactory terminus to the problem. The manual and the laboratory pamphlet leave little to be desired in the way of clarity, simplicity, combined with adequate presentation of most of the fundamentals. One suspects that the work outlined would be practical for many institu-

tions besides the high schools, junior colleges and agricultural colleges for which it is recommended.

THE ORPHAN CHILD AMONG THE GUNANTUNA, JOSEPH MEIER, *Catholic Anthropological Conference, Washington, D. C., 1939. \$1.00.*

This is the third and last contribution by the author to our anthropological knowledge of the peoples of New Britain, Bismarck Archipelago. Both of its predecessors have been noticed favorably in these pages. The author is a missionary in the district who has time and intelligence enough to preserve the language and tribal customs of the region for future study in his papers.

PLANT GROWTH SUBSTANCES, HUGH NICOL, *Chemical Publishing Co., New York, 1938. \$2.00.*

Plant chemiculture, that boon to nations with small land areas, is discovering that balanced solutions of mineral salts are not all of the story of forcing vegetation. This little English manual deals with the whole picture, bringing to it not only the chemical but also those hormone combinations which are best calculated to speed up growth. It is not too technical for the interested layman with a background of knowledge gained by experience, or reading in the field.

PLANT MICROTECHNIQUE, DONALD A. JOHANSEN, *McGraw-Hill Book Co., New York, 1940. \$4.50.*

Botanical technicians will find this book to be the biggest four and a half dollars worth that has come from any publisher's office in many a moon. It supplies exactly the type of information plant cytologists and histologists have been collecting from research papers, technical journals, and advertising literature. The first half of the book is devoted to general techniques, the second part deals with the special methods which have been successful with different members of the different phyla.

THE PRINCIPLES OF HEREDITY, LAURENCE H. SNYDER, *D. C. Heath & Co., Boston, 1940. \$3.50.*

About the best testimony a book can have is the enthusiastic acceptance it

receives. It is only five years ago that Professor Snyder's manual on genetics first appeared. Now it is out in a second edition, revised, extended and brought up to date. As in the first edition, the chief emphasis, outside of an interesting approach, is laid on human and agricultural applications of genetic principles,—after all, one can get too much of *Drosophila*. A helpful feature is embodied in some 500 odd problems for students to study.

THE PROSPECTS OF PHILOSOPHY, JOHN J. ROLBIECKI, *Benziger Brothers, New York, 1940. \$2.50.*

Dr. Rolbiecki has about as thorough a background in biological education as could be wished for in a philosophical authority. Hence his new book has been defined as "an attempt to correlate the principles of philosophy with the sciences. It presupposes some knowledge of both. Though progress in philosophy is not to be judged solely by its applicability to practical affairs, yet, as the author rightly points out, the philosophical implications of any science must be given due consideration."

RUBBER LATEX, H. P. and W. H. STEVENS, *Chemical Publishing Co., New York, N. Y., 1940. \$2.00.*

Two British authorities in the rubber industry here present a summary of the latest developments in the latex field. There is a discussion of the techniques employed, from the gathering of the crude raw material until it has been processed to the finished commercial product. There is also a compendious list of British patents and plans for latex usage.

THE SPIDER BOOK, JOHN HENRY COMSTOCK, *Doubleday, Doran & Co., New York, 1940. \$6.00.*

The first Spider Book came from the pen of Dr. Comstock in 1912. It has long been out of print. The entomological world, and science librarians in particular will therefore welcome this newly revised and enlarged edition which comes from the office of Dr. W. J. Gertsch, associate curator in the department of entomology at the American Museum of Natural History. As a result of his labors, we now have a fresh definitive volume on these much misunderstood insects.

WILD BIRD NEIGHBORS, ALVIN M. PETERSON, *Bruce Pub. Co., Milwaukee, 1940. \$2.00.*

This is an interesting little volume by the author of a previous work, "The ABC of Attracting Birds" which has been noticed in these columns. Some thirty-odd birds are discussed, not a little practical natural history being introduced into the articles. The book makes no pretensions at being scientific. There are no taxonomic references. It should, however, be popular in public libraries, as well as among bird-lovers of less formalized education and methods of approach.

WONDER CREATURES OF THE SEA, A. HYATT VERRILL, *D. Appleton-Century Co., New York, 1940. \$3.00.*

Dr. Verrill is adding steadily to the impressive list of his popular natural history books. The present volume deals mostly with the invertebrates found in American waters, mostly tropical. It is copiously illustrated by the

author's own pen sketches of the representative species in the various phyla, and also by many photographs. Like its many predecessors, it should be a popular library book for high schools and for college freshmen, who do not mind enlivening the sometimes dry-as-dust professorial lectures by closer contact with such lively word pictures as those of this author.

THE WORLD UNDER THE SEA, B. WEBSTER SMITH, *D. Appleton-Century Co., New York, 1940. \$3.00.*

This will be a fine library book for those who wish to get a comprehensive idea of under-sea life. It covers in an interesting and general fashion about all there is to know of the principles of oceanography, and the various denizens of the oceans, from the protozoa to the whales. As an argument for an intelligent international program of marine conservation it is very valuable.

THE AUTHOR PUBLISHER PRINTER COMPLEX, ROBERT S. GILL, *Williams & Wilkins Co., Baltimore, 1940. \$1.00.*

Here is an engaging little book which is cheap enough to warrant being in every biology, and most biologist's, library. It is the simplest, clearest, and most interesting treatise on how to prepare a manuscript for publication that it has thus far been our good fortune to review.

COMPARATIVE PSYCHOLOGY, VOL. II, PLANTS AND INVERTEBRATES, C. J. WARDEN, T. N. JENKINS, L. H. WARNER, *The Ronald Press Co., New York, N. Y., 1940. \$6.00.*

This is the third volume in the complete set of three produced by these authors, of which the first and third have already appeared. Those who are looking for a compendious treatise on the basic reactions of plants and animals to various types of stimuli will

wish to have this really fundamental set of books. Primarily interesting to psychologists, they will be of great use to ecologists, natural historians, and as background material, to biologists in general.

EMBALMING FLUIDS, SIMON MENDEL-SOHN, *Chemical Publishing Co., New York, 1940. \$4.00.*

Most biologists will wonder what on earth use a review on this book might have to warrant its inclusion here. Buy the book and find out. One doesn't need to have a morbid interest in the processes of mummification in vogue among morticians. After all, the undertaking business isn't so far removed from a number of our biological techniques. We all start off from scratch in our desire to preserve something we want to look at from too immediate decay. Perhaps there are leads here, in the many formulae offered, for new histological developments.



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